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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/765,894	01/29/2004	Yasuyuki Tamura	042069	2503

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EXAMINER	
KIM, SU C	

ART UNIT	PAPER NUMBER
2823	

DATE MAILED: 08/23/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/765,894	TAMURA ET AL.	
	Examiner	Art Unit	
	Su C. Kim	2823	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *29 January 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-23* is/are pending in the application.

4a) Of the above claim(s) *12-23* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☐ Claim(s) *1-11* is/are rejected.

7)☒ Claim(s) *1, 2, 6 & 7* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *29 January 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☒ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *4/29/2004*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Objections

Claims 1, 2, 6, & 7 are objected to because of the following informalities: "High" dielectric is relative term, which require specification or describes what high means in the claim. Appropriate correction is required.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1 & 6 are rejected under 35 U.S.C. 102(b) as being anticipated by Rodder et al. (US 6251761).

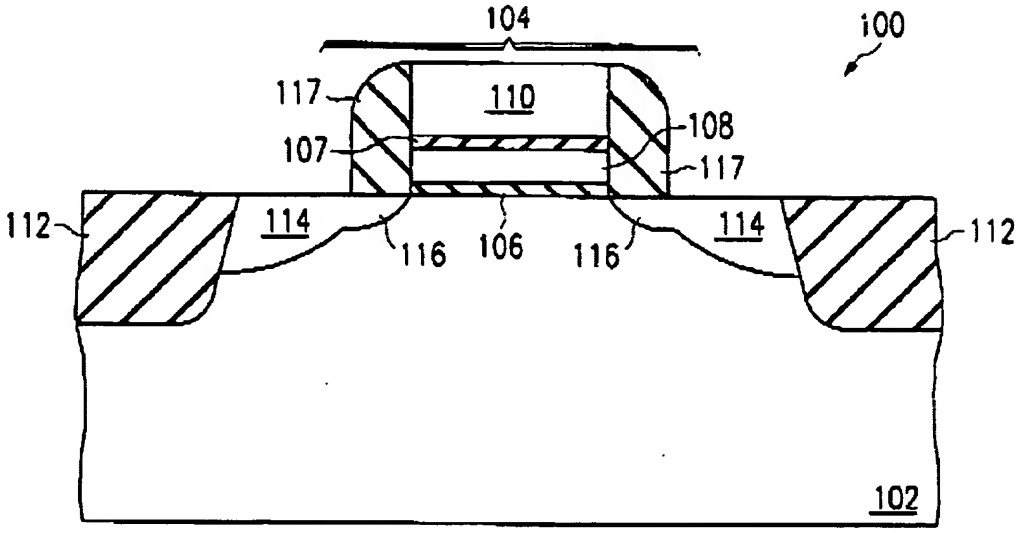


FIG. 1

Rodder discloses semiconductor device with multi-insulated layers as claimed.

See all the FIGS where Rodder teaches the following limitations

1. Pertaining to claims 1 & 6, Rodder discloses a semiconductor device comprising: a gate insulation film **106 108 & 107** which formed on a semiconductor substrate **102** and includes a silicon oxide- based insulation film **106**, formed high dielectric constant film **108** formed on the silicon oxide-based insulation film, and an oxygen diffusion preventing **107** film formed on the high dielectric constant film and having a lower oxygen diffusion coefficient than the high dielectric constant film; and
a gate electrode **110** formed on the gate insulation film.

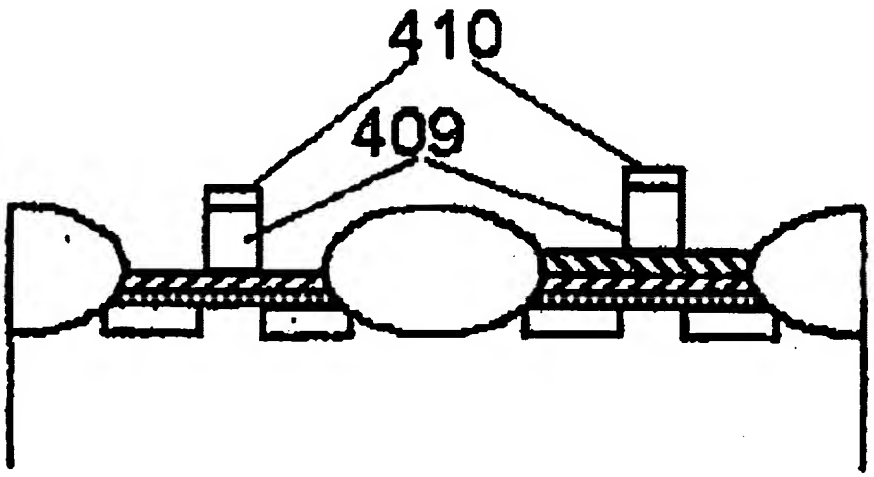
Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 2- 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Watanabe (US Pub 20050167761) in view of Chau et al (US 6713358).

Fig. 4D



Watanabe discloses a semiconductor device as claimed. **See all the FIGS** where Watanabe teaches the following limitations

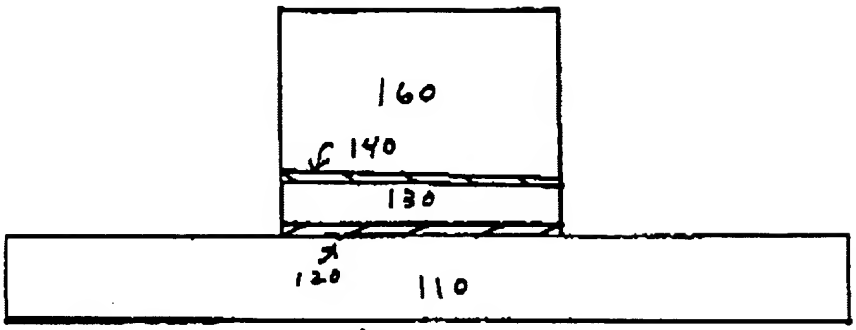


Figure 1d

Chau discloses a semiconductor device as claimed. **See all the FIGS** where Chau teaches the following limitations

2. Pertaining to claims 2 & 7, Watanabe discloses a semiconductor device comprising:

a first gate insulation film **403** formed on a first region of semiconductor substrate and including a silicon oxide-based insulation film **403(Please note element 403 is silicon oxide)**, a high dielectric constant film **404 (ZrO2)** formed on the silicon oxide-based insulation film, and an oxygen diffusion preventing film **405(Please note element 405 is Zr silicate which is one of oxygen diffusion prevention film such as Hf silicate)** formed on the high dielectric constant film and having a lower oxygen diffusion coefficient than the high dielectric constant film;

a first gate electrode **409** formed on the first gate insulation film;

a second gate insulation film formed on a second region of the semiconductor substrate and including the high dielectric constant film **404**

Watanabe fails to teach the oxygen diffusion preventing film formed on the high dielectric constant film. Chau discloses the oxygen diffusion preventing film **104** formed on the high dielectric constant film. In view of Chau, it would have been obvious to one of ordinary skill in the art to incorporate the process layer of Chau into the Watanabe because "adding nitrogen into a silicon oxidation film to form the gate insulator film having an increased dielectric constant compare with a pure silicon oxidation film and thereby reducing effective thickness of the gate insulator film without physically thinning the film thickness" **(Column 1 and lines 42-49)**.

3. Pertaining to claim 3, Watanabe discloses a semiconductor device according to claim 1, wherein the high dielectric constant film **404** is hafnium oxide film or a zirconium oxide film.

4. Pertaining to claim 4, Watanabe discloses a semiconductor device according to claim 2, wherein the high dielectric constant film **404** is hafnium oxide film or a zirconium oxide film.

5. Pertaining to claim 5, Chau discloses a semiconductor device according to claim 1, wherein oxygen diffusion preventing film **104** a silicon nitride film, an alumina film, an aluminum silicate film, a hafnium aluminate film or a hafnium silicate film.

Claims 8-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Watanabe (US Pub 20050167761) further in view of Chau (US 6713358) and further in view of Yu (US 6784101).

6. Pertaining to claims 8-11, Watanabe further in view of Chau fails to discloses oxygen preventing film **104** hafnium aluminate film. Yu teaches using hafnium aluminate film as high dielectric film **(column 2 line 44-45)**. In view of Yu, it would have been obvious to one of ordinary skill in the art to incorporate the high dielectric material of Yu into the Watanabe because "the increased capacitance permittivity of the gate dielectric material advantageously results in improved device performance" **(column 2 lines 20-23).**

7. Pertaining to claims 10-11, Watanabe further in view of Chau & Yu discloses dielectric material is hafnium aluminate film. Watanabe further in view of Chau & Yu fail to teach an alumina content ratio of the hafnium aluminate film is above 50 % including 50 %. However claims 10-11 are rejected under 35 U.S.C. 103 (a) as being unpatentable over Watanabe further in view of Chau & Yu and in view of optimum workable range.

Given the teaching of the references, it would have been obvious to determine the optimum thickness, temperature as well as condition of delivery of the layers involved. *See In re Aller, Lacey and Hall* (10 USPQ 233-237) "It is not inventive to discover optimum or workable ranges by routine experimentation. Note that the specification contains no disclosure of either the critical nature of the claimed ranges or any unexpected results arising therefrom. Where patentability is said to be based upon particular chosen dimensions or upon another variable recited in a claim, the Applicant must show that the chosen dimensions are critical. *In re Woodru* ; 919 f 2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

Any differences in the claimed invention and the prior art may be expected to result in some differences in properties. The issue is whether the properties differ to such an extent that the difference is really unexpected. *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986)

Appellants have the burden of explaining the data in any declaration they proffer as evidence of non-obviousness. *Ex parte Ishizake*, 24 USPQ2d 1621, 1624 (Bd. Pat. App. & Inter. 1992).

An Affidavit or declaration under 37 CFR 1.132 must compare the claimed subject matter with the closest prior art to be effective to rebut a prima facie case of obviousness. *In re Burckel*, 592 F.2d 1175, 201 USPQ 67 (CCPA 1979).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Su C. Kim whose telephone number is (571) 272-5972. The examiner can normally be reached on Monday - Friday, 8:30AM to 5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew S. Smith can be reached on (571) 272-1907. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Su C Kim
08/22/2005

W. DAVID COLEMAN
PRIMARY EXAMINER